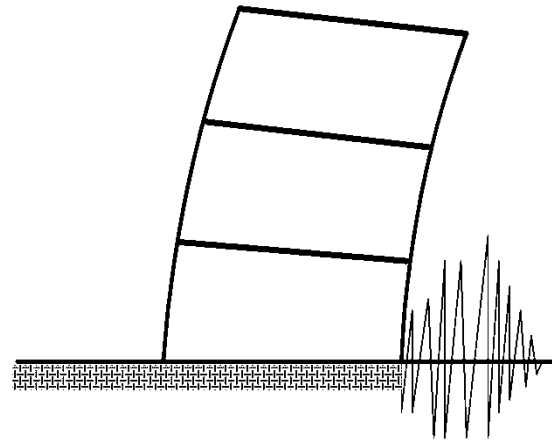




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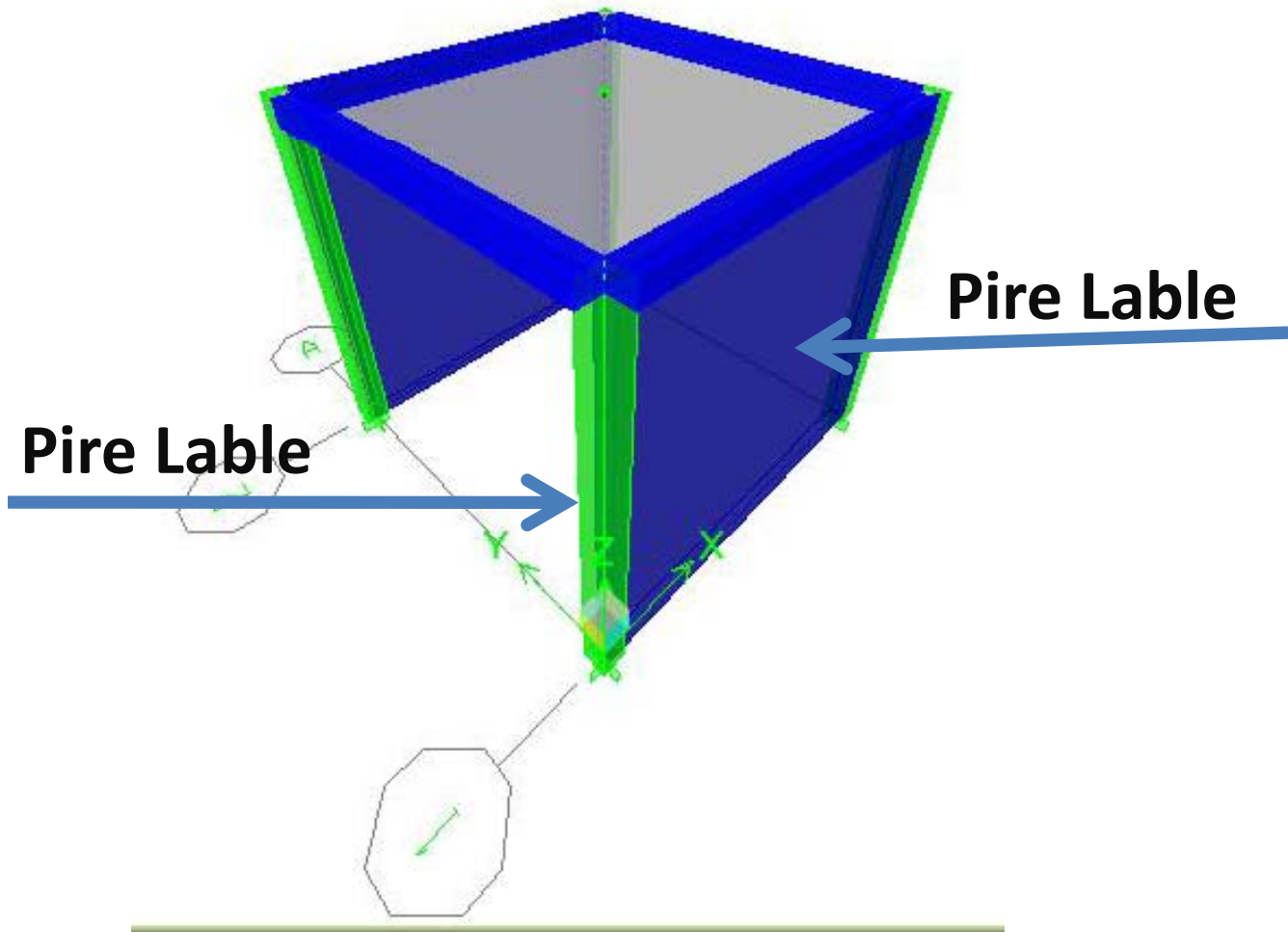
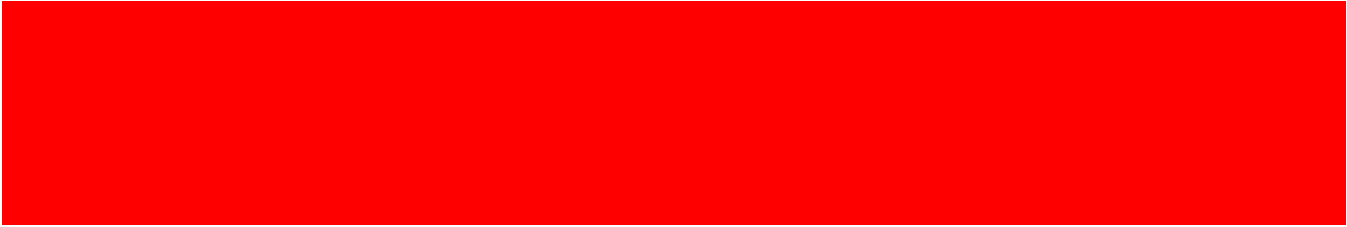




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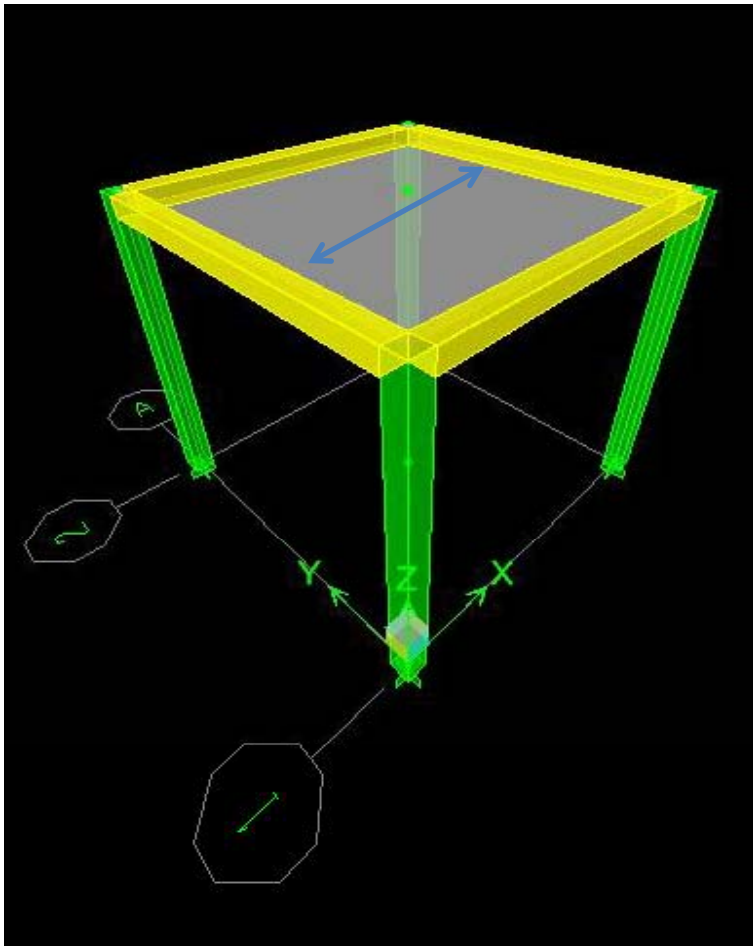


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A,B

, Cx=0.1

Cy=0

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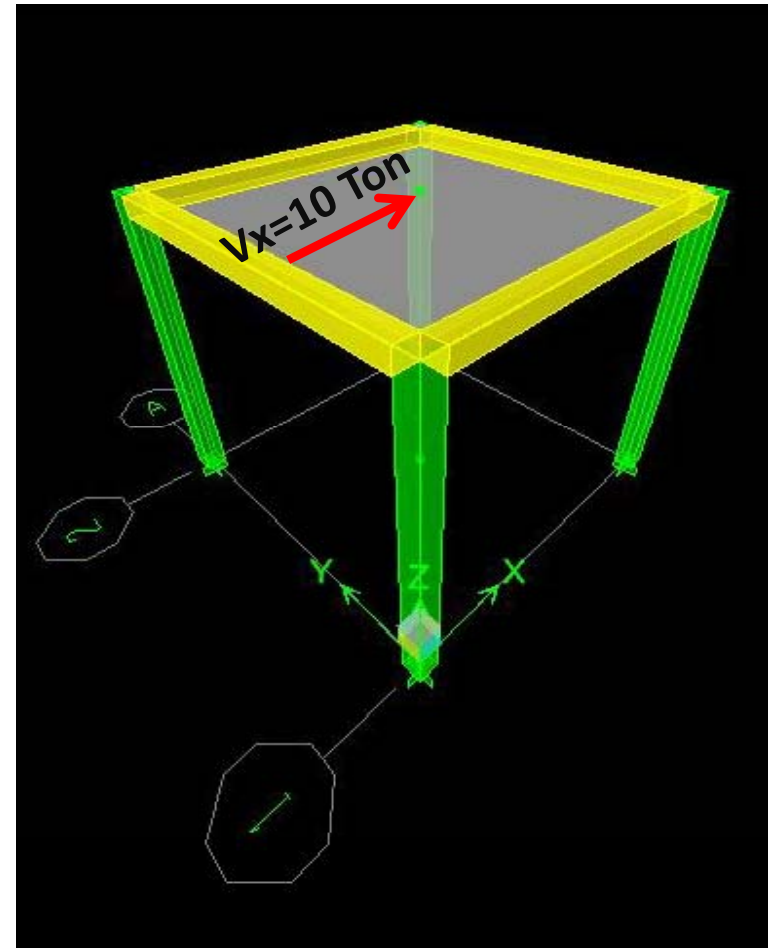


$$V_x = C_x \cdot W$$

$$W = (5+5) \cdot 10 = 100 \text{ ton}$$

$$C_x = 0.1$$

$$V_x = C_x \cdot W = 0.1 \cdot 100 = 10 \text{ Ton}$$



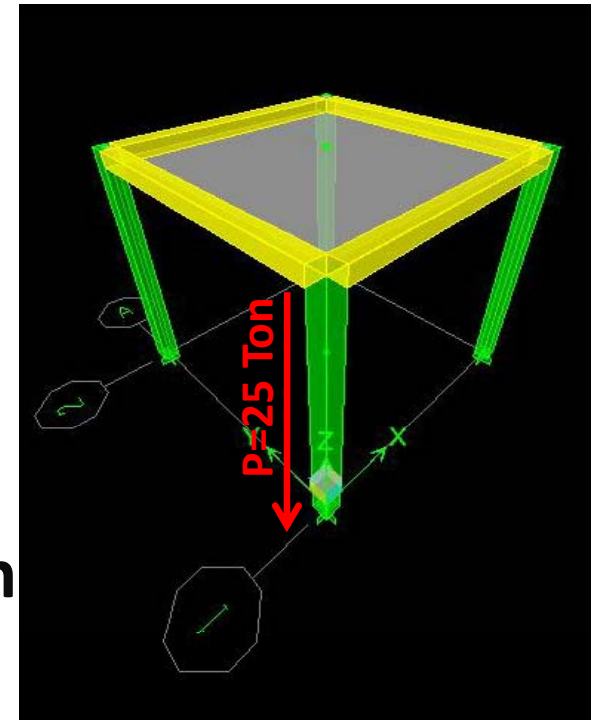
Total Self Weight= 0 Ton

Dead Load= (5+5)*10= 100 Ton

Earth quick Shear $V=C*W=100*0.1=10$ Ton

Column Axial Load= $100/4= 25$ Ton

Shear $V=10/4=2.5$ Ton

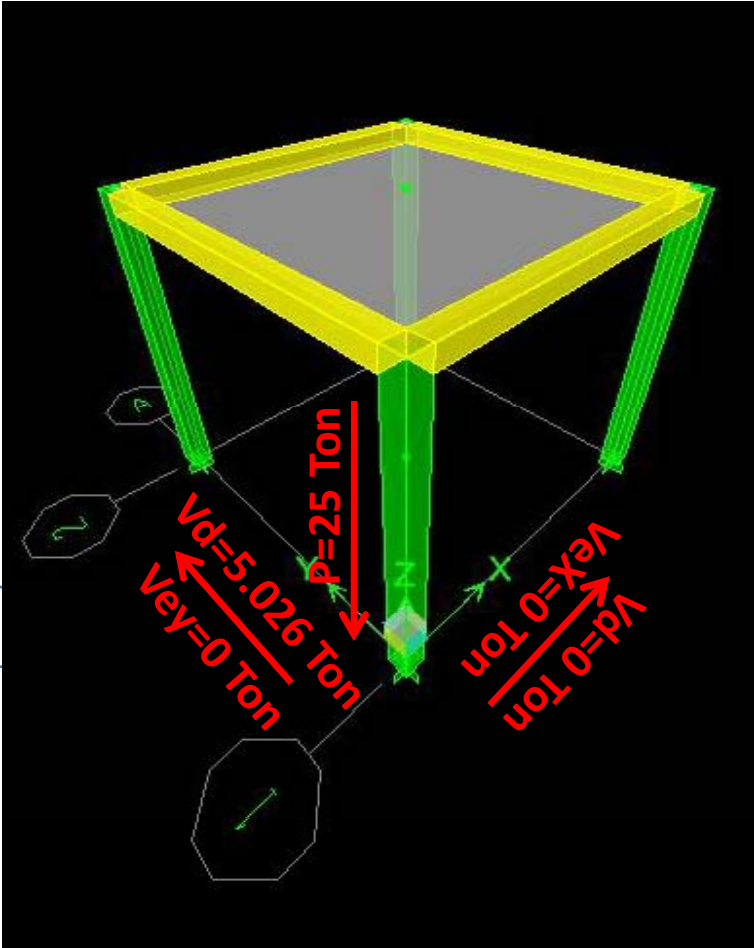


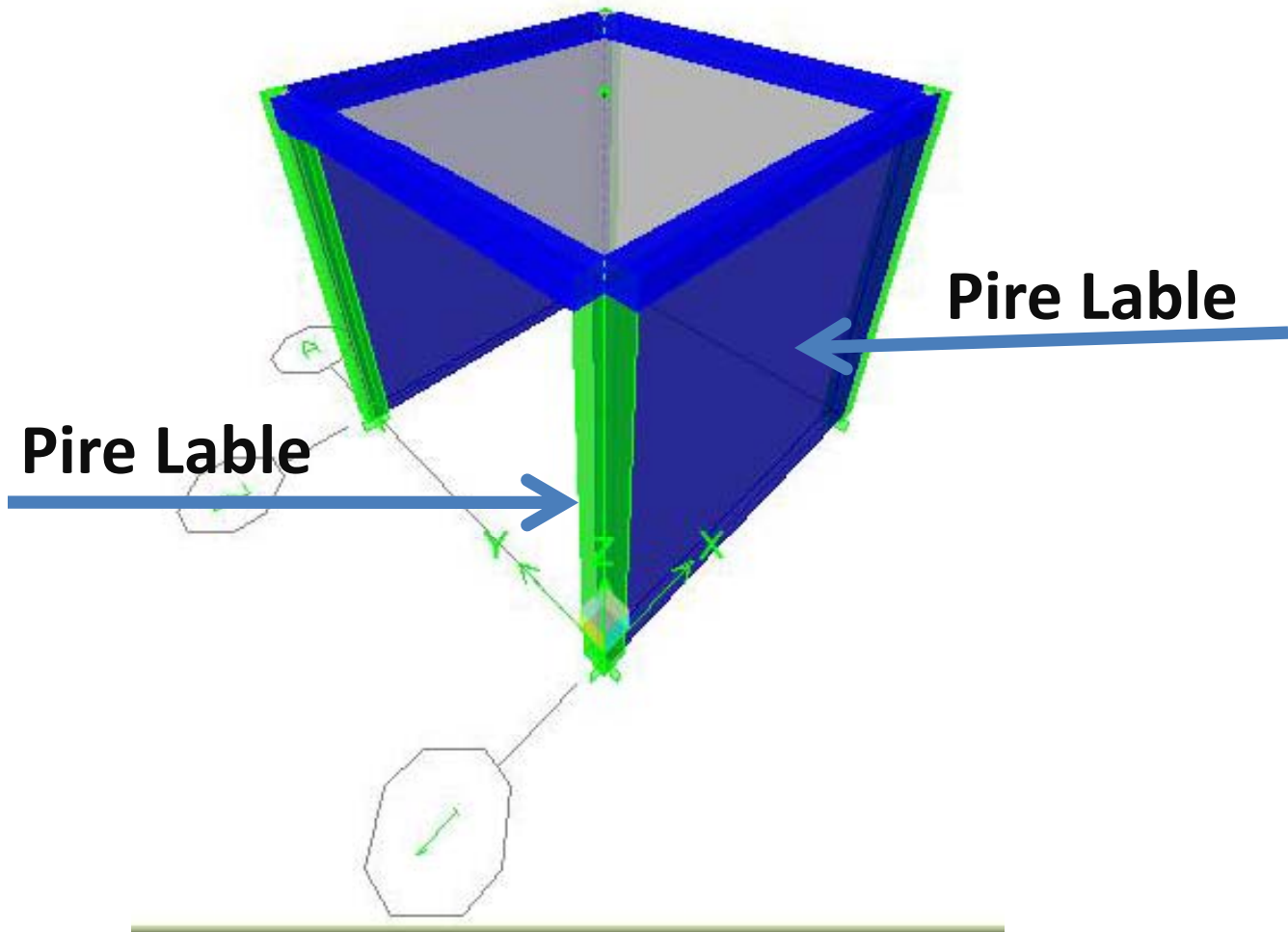
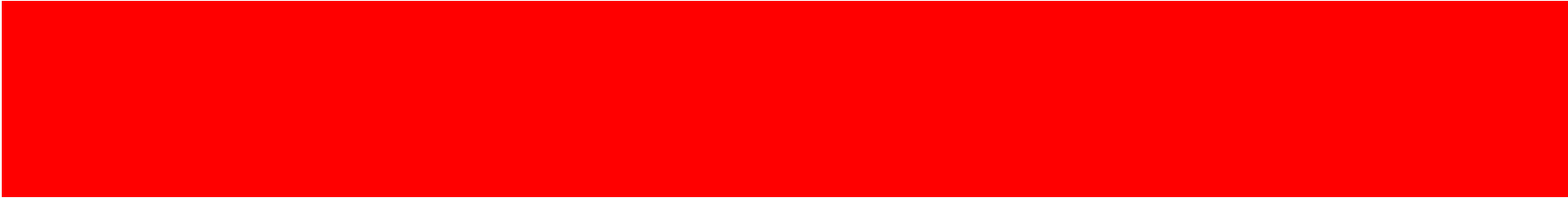
Etabs

ETABS Concrete Design

Engineer _____
 Project _____
 Subject _____

ACI 318-99 COLUMN SECTION DESIGN Type: Sway Special Units: Ton-m (Summary)					
Level	: STORY1	L=5.000			
Element	: C13	B=0.300	D=0.300	dc=0.046	
Section ID	: C30X30	E=2330000.000	fc=2400.000	Lt.Wt. Fac.=1.000	
Combo ID	: COMB1	fy=40000.000	fys=30000.000		
Station Loc	: 4.700	RLLF=1.000			
Phi (Compression-Spiral):	0.750				
Phi (Compression-Tied):	0.700				
Phi (Tension):	0.900				
Phi (Bending):	0.900				
Phi (Shear/Torsion):	0.850				
AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR PU, M2, M3					
Rebar	Design	Design	Design	Minimum	Minimum
Area	PU	M2	M3	M2	M3
O/S #2	25.000	15.230	0.000	0.606	0.606
AXIAL FORCE & BIAXIAL MOMENT FACTORS					
	Factor	Delta ns	Delta s	K	L
Major Bending (M3)	1.000	1.311	1.000	1.000	4.700
Minor Bending (M2)	0.400	1.000	1.000	1.000	4.700
SHEAR DESIGN FOR V2,V3					
Rebar	Shear	Shear	Shear	Shear	Shear
AV/s	Vu	phi*Vc	phi*Vs	Vp	Vp
Major Shear (V2)	0.000	0.000	6.380	0.000	0.000
Minor Shear (V3)	3.515E-04	5.026	6.380	2.280	0.000
JOINT SHEAR DESIGN					
Joint	Shear	Shear	Shear	Shear	Joint
Ratio	VuTop	VuTot	phi*Vc	Vp	Area
Major Shear (V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear (V3)	N/A	N/A	N/A	N/A	N/A
(6/5) BEAM/COLUMN CAPACITY RATIOS					
Major	Ratio	Minor	Ratio		
	N/A		N/A		
O/S #2 Reinforcing required exceeds maximum allowed					
Notes:					
N/A: Not Applicable					
N/C: Not Calculated					
N/N: Not Needed					







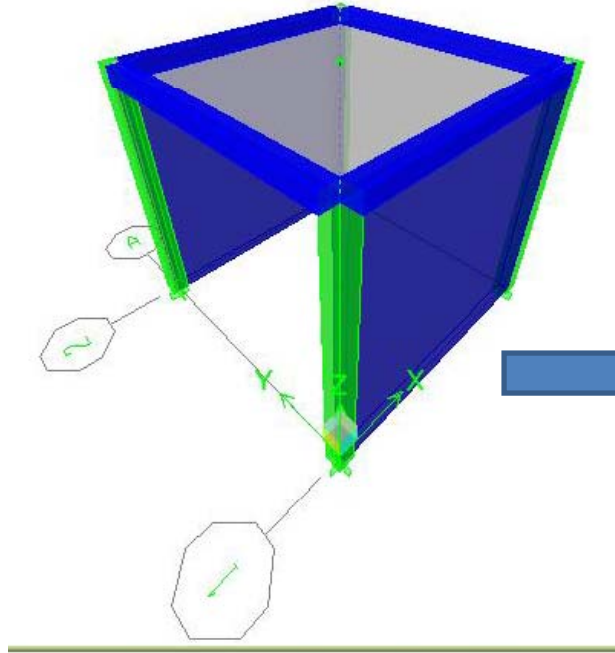
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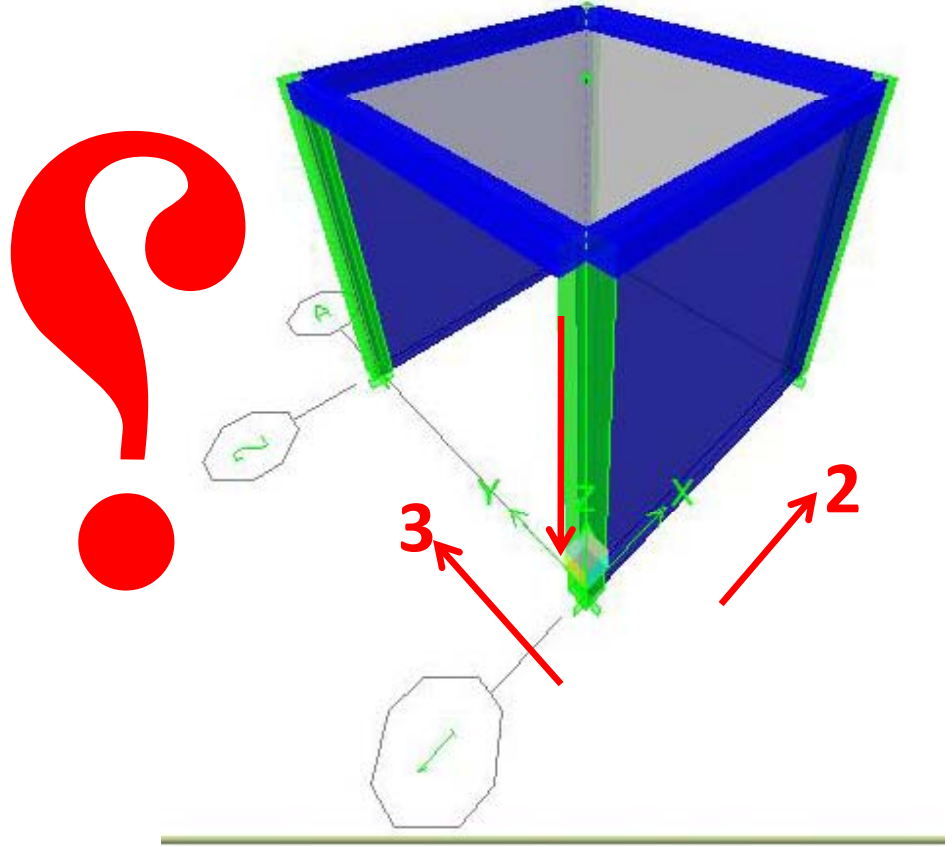
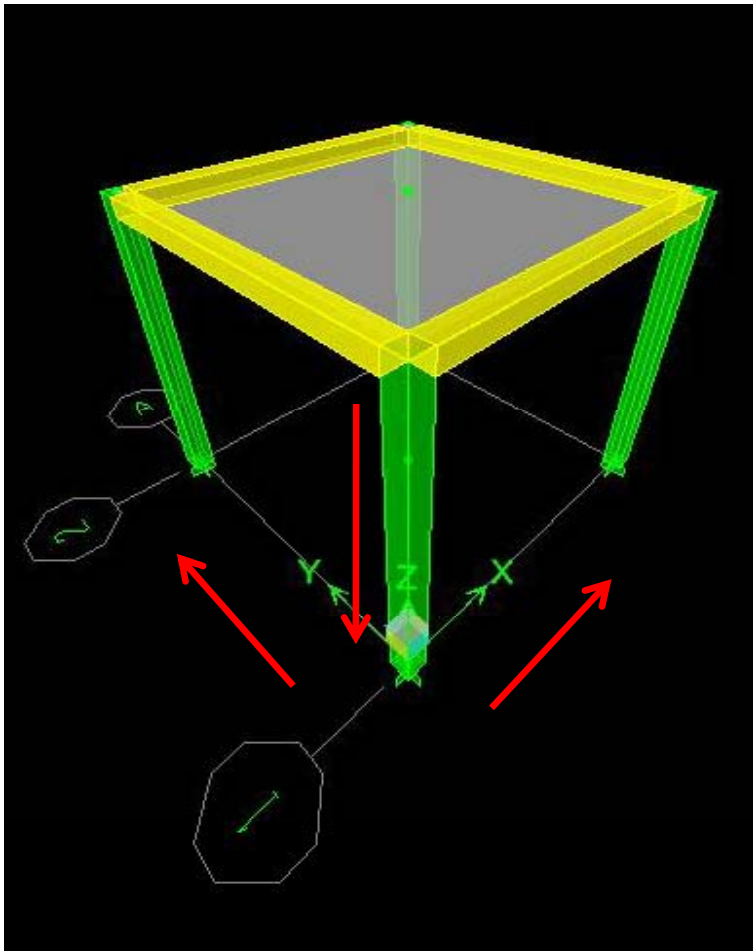
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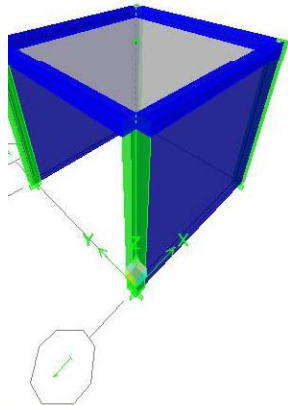
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Concrete Design

Engineer _____
Project _____
Subject _____

UMN SECTION DESIGN	Type: Sway Special	Units: Ton-m	(Summary)
STORY1	L=5.000		
C13	B=0.300	D=0.300	dc=0.046
C30X30	E=2330000.000	fc=2400.000	Lt.Wt. Fac.=1.000
COMB1	fy=40000.000	fys=30000.000	
4.700	RLLF=1.000		

Phi (Compression-Spiral):	0.750
Phi (Compression-Tied):	0.700
Phi (Tension):	0.900
Phi (Bending):	0.900
Phi (Shear/Torsion):	0.850

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR FU, M2, M3						
Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3	
0.002	8.264	7.438	-0.217	0.200	0.200	

AXIAL FORCE & BIAXIAL MOMENT FACTORS						
Factor	Delta_ns	Delta_s	K	L		
Major Bending (M3)	1.000	1.085	1.000	1.000	4.700	
Minor Bending (M2)	0.400	1.000	1.000	1.000	4.700	

SHEAR DESIGN FOR V2,V3					
Rebar Av/s	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp	
Major Shear (V2)	0.000	0.000	5.675	0.000	0.000
Minor Shear (V3)	0.000	2.450	5.675	0.000	0.000

JOINT SHEAR DESIGN					
Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area	
Major Shear (V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear (V3)	N/A	N/A	N/A	N/A	N/A

(6/5) BEAM/COLUMN CAPACITY RATIOS	
Major Ratio	Minor Ratio
N/A	N/A

Notes:
N/A: Not Applicable
N/C: Not Calculated
N/N: Not Needed

P1

ETABS Concrete Design

Engineer _____
Project _____
Subject _____

ACI 318-99 COLUMN SECTION DESIGN	Type: Sway Special	Units: Ton-m	(Summary)
Level : STORY1	L=5.000		
Element : C13	B=0.300	D=0.300	dc=0.046
Section ID : C30X30	E=2330000.000	fc=2400.000	Lt.Wt. Fac.=1.000
Combo ID : COMB1	fy=40000.000	fys=30000.000	
Station Loc : 4.700	RLLF=1.000		

Phi (Compression-Spiral):	0.750
Phi (Compression-Tied):	0.700
Phi (Tension):	0.900
Phi (Bending):	0.900
Phi (Shear/Torsion):	0.850

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR FU, M2, M3						
Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3	
O/S #2	25.000	15.230	0.000	0.606	0.606	

AXIAL FORCE & BIAXIAL MOMENT FACTORS						
Factor	Delta_ns	Delta_s	K	L		
Major Bending (M3)	1.000	1.311	1.000	1.000	4.700	
Minor Bending (M2)	0.400	1.000	1.000	1.000	4.700	

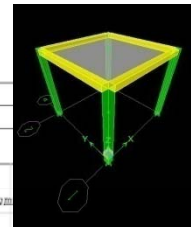
SHEAR DESIGN FOR V2,V3					
Rebar Av/s	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp	
Major Shear (V2)	0.000	0.000	6.380	0.000	0.000
Minor Shear (V3)	3.515E-04	5.026	6.380	2.280	0.000

JOINT SHEAR DESIGN					
Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area	
Major Shear (V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear (V3)	N/A	N/A	N/A	N/A	N/A

(6/5) BEAM/COLUMN CAPACITY RATIOS	
Major Ratio	Minor Ratio
N/A	N/A

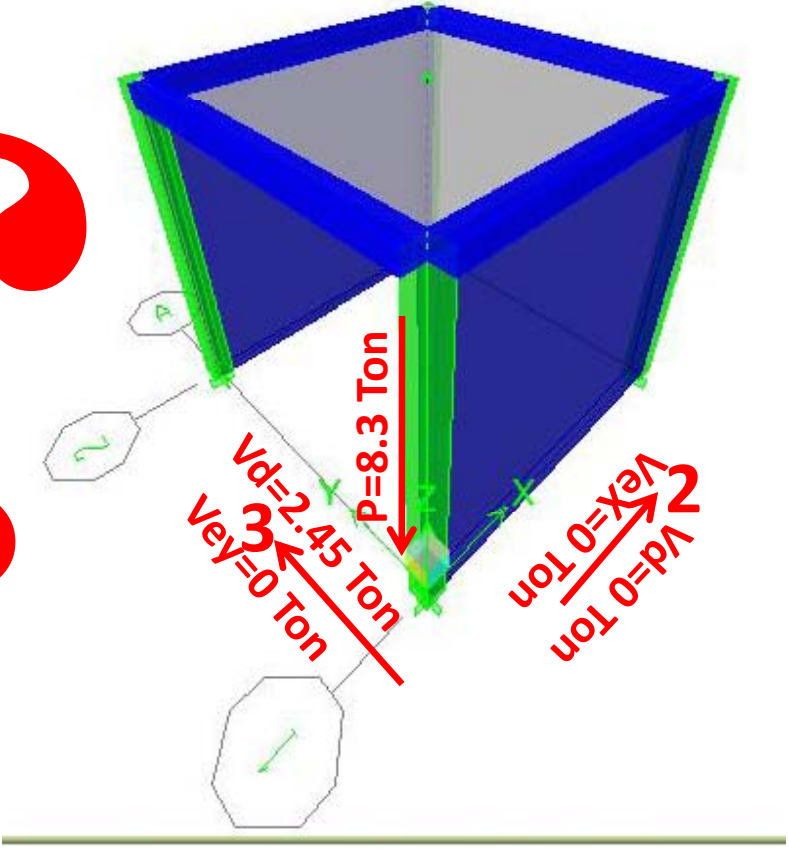
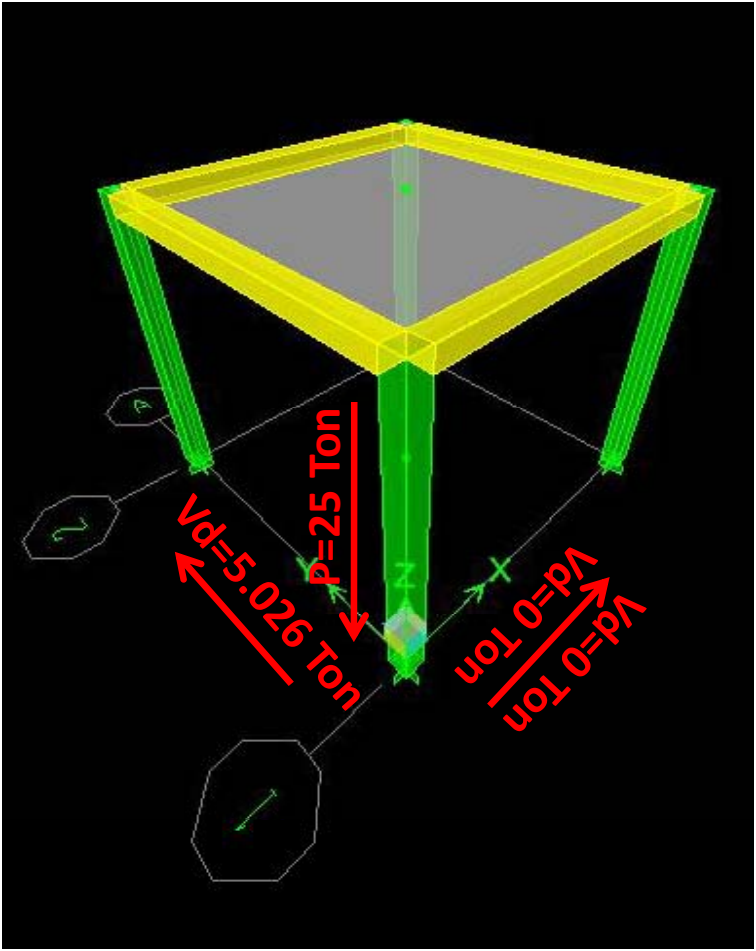
O/S #2 Reinforcing required exceeds maximum allowed

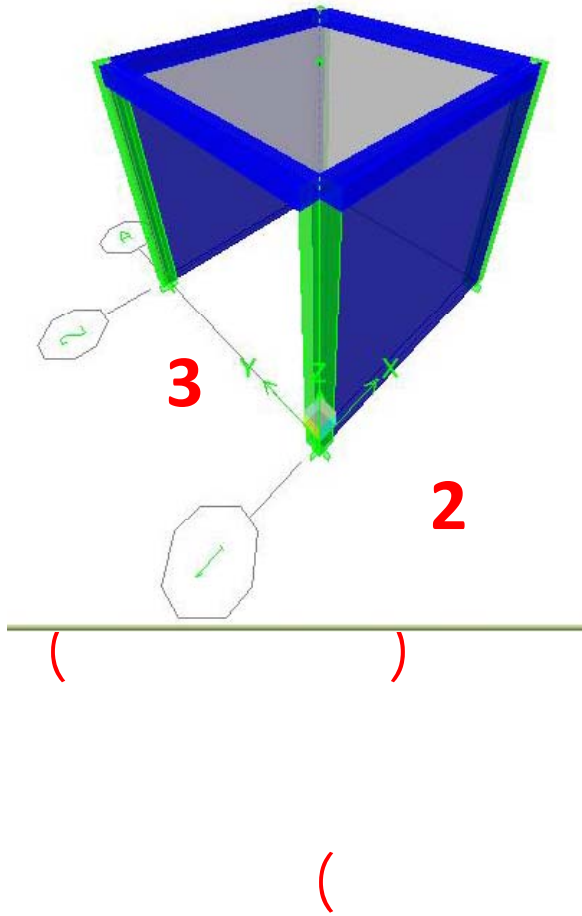
Notes:
N/A: Not Applicable
N/C: Not Calculated
N/N: Not Needed



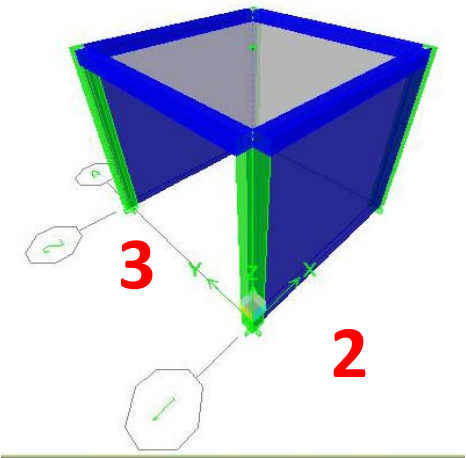


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	Pu	M2	M3	V2	V3
P1	Ton	Ton-m	Ton-m	Ton	Ton
	25	15.23	0	0	5.026
	8.264	7.438	-0.217	0	2.45
	%67	%52	-	-	%52



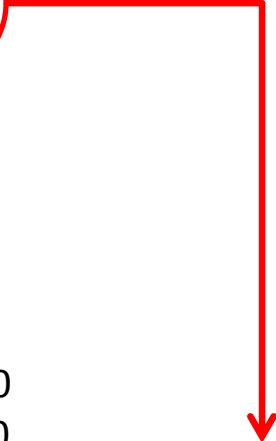
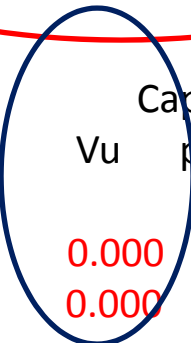
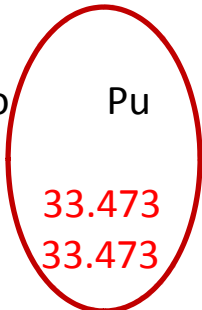
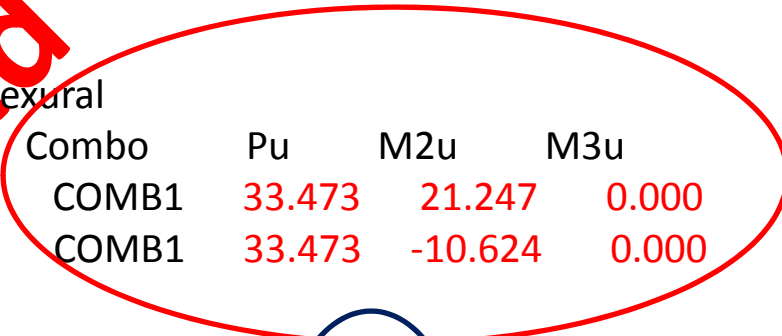
Flexural Design Data Units Ton-m

Station	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	Pu	M2u	M3u
Top	0.0072	0.0033	COMB1	33.473	21.247	0.000
Bottom	0.0025	0.0033	COMB1	33.473	-10.624	0.000

Shear Design Data

Station	Rebar cm ² /m	Shear Combo	Pu	Mu	Vu	Capacity phi Vc	Capacity phi Vn
Top Leg 1	5.000	COMB1	33.473	0.000	0.000	11.830	47.830
Bot Leg 1	5.000	COMB1	33.473	0.000	0.000	11.830	47.830

Dead Load



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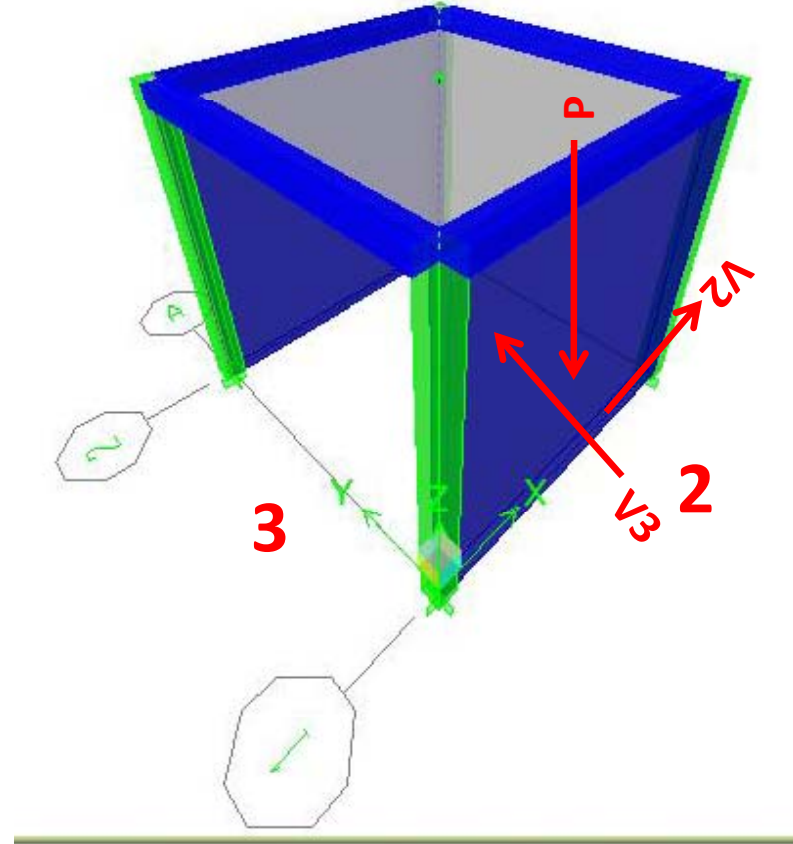


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Uniform

Flexural Design Data

Station	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	Pu	M2u	M3u
Top	0.0112	0.0034	COMB1	50.000	37.536	0.000
Bottom	0.0039	0.0034	COMB1	50.000	-18.832	0.000

Shear Design Data

Station	Rebar	Shear Combo	Pu	Mu	Capacity Vu	Capacity phi Vc	Capacity phi Vn
Top Leg 1	5.000	COMB1	33.473	0.000	0.000	11.830	47.830
Bot Leg 1	5.000	COMB1	33.473	0.000	0.000	11.830	47.830

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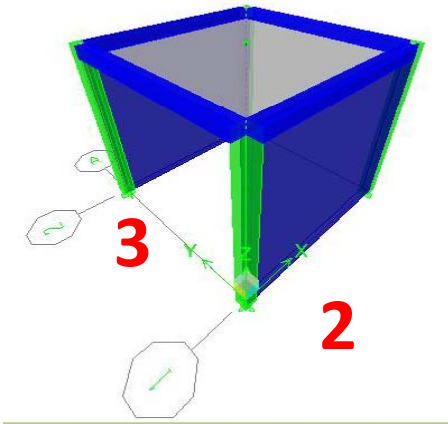
Flexural Design Data

Station	Edge Length	Tension Rebar cm ²	Tension Combo	Pu	Mu
Left Top	0.236	0.000	COMB1	50.000	0.000
Right Top	0.236	0.000	COMB1	50.000	0.000
Left Bottom	0.236	0.000	COMB1	50.000	0.000
Right Bottom	0.236	0.000	COMB1	50.000	0.000

Station	Edge Length	Compression Rebar cm ²	Compression Combo	Pu	Mu
Left Top	0.236	0.000	COMB1	50.000	0.000
Right Top	0.236	0.000	COMB1	50.000	0.000
Left Bottom	0.236	0.000	COMB1	50.000	0.000
Right Bottom	0.236	0.000	COMB1	50.000	0.000

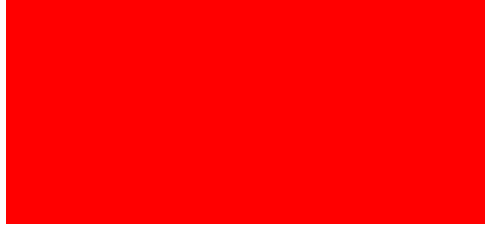
Shear Design Data

Station	Rebar cm ² /m	Shear Combo	Pu	Mu	Vu	Capacity phi Vc	Capacity phi Vn
Top	5.900	COMB1	50.000	0.000	0.000	13.960	56.440
Bottom	5.900	COMB1	50.000	0.000	0.000	13.960	56.440



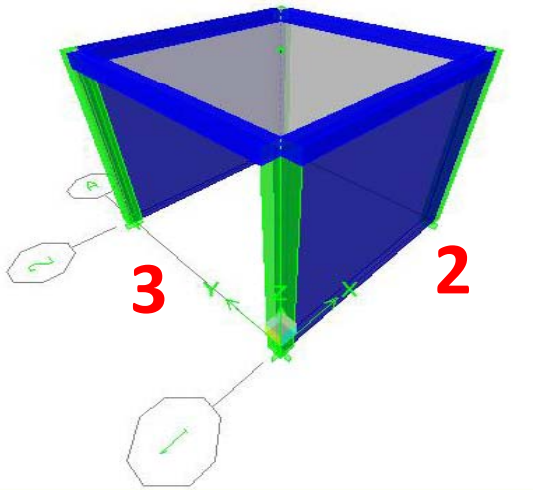
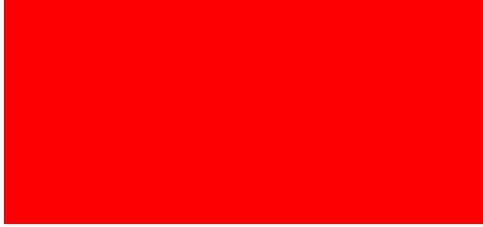
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Uniform



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General



Uniform

Flexural Design Data

Station Location	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	Pu	M2u	M3u
Top	0.0050	0.0238	COMB3	50.000	37.536	0.000
Bottom	0.0025	0.0238	COMB3	50.000	-18.832	25.005

Shear Design Data

Station Location	Rebar cm ² /m	Shear Combo	Pu	Mu	Capacity Vu	Capacity phi Vc	Capacity phi Vn
Top Leg 1	5.000	COMB3	33.473	-7.506	4.996	49.293	94.293
Bot Leg 1	5.000	COMB3	33.473	17.478	4.996	49.293	94.293

Boundary Element Check Data

Station Location	B-Zone Length	B-Zone Combo	Pu	Mu	Vu	Po	Pu/Po
Top Leg 1	Not Needed	COMB3	33.473	-7.506	4.996	2799.200	0.0120
Bot Leg 1	Not Needed	COMB3	33.473	17.478	4.996	2799.200	0.0120

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Flexural Design Data

Station Location	Edge Length	Tension Rebar cm ²	Tension Combo	Pu	Mu
Left Top	0.200	0.000	COMB3	50.000	0.000
Right Top	0.200	0.000	COMB3	50.000	0.000
Left Bottom	0.200	0.000	COMB3	50.000	25.005
Right Bottom	0.200	0.000	COMB3	50.000	25.005

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Station Location	Edge Length	Compression Rebar cm ²	Compression Combo	Pu	Mu
Left Top	0.200	0.000	COMB3	50.000	0.000
Right Top	0.200	0.000	COMB3	50.000	0.000
Left Bottom	0.200	0.000	COMB3	50.000	25.005
Right Bottom	0.200	0.000	COMB3	50.000	25.005

Shear Design Data

Station Location	Rebar cm ² /m	Shear Combo	Pu	Mu	Capacity Vu	Capacity phi Vc	Capacity phi Vn
Top	5.000	COMB3	50.000	0.000	5.000	49.293	94.293
Bottom	5.000	COMB3	50.000	25.005	5.000	49.293	94.293

General

Flexural Check Data

Station Location	D/C Ratio	Flexural Combo	Pu	M2u	M3u
Top	0.9287	COMB3	50.000	37.536	0.000
Bottom	0.0462	COMB3	50.000	-18.832	25.005



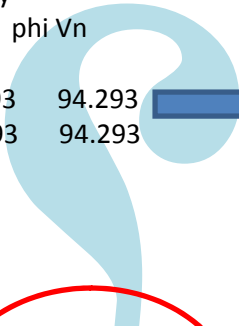
Shear Design Data

Station Location	Rebar cm ² /m	Shear Combo	Capacity Pu	Capacity Mu	Capacity Vu	Capacity phi Vc	Capacity phi Vn
Top Leg 1	5.000	COMB3	33.473	-7.506	4.996	49.293	94.293
Bot Leg 1	5.000	COMB3	33.473	17.478	4.996	49.293	94.293



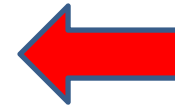
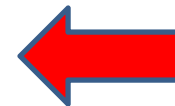
Boundary Element Check Data

Station Location	B-Zone Length	B-Zone Combo	Pu	Mu	Vu	Po	Pu/Po
Top Leg 1	Not Needed	COMB3	33.473	-7.506	4.996	2389.339	0.0140
Bot Leg 1	Not Needed	COMB3	33.473	17.478	4.996	2389.339	0.0140





Uniform , General



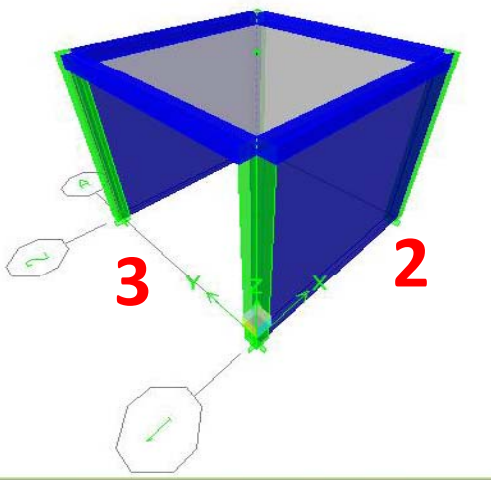
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Uniform

Flexural Design Data

Station Location	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	Pu	M2u	M3u
Top	0.0126	0.0117	COMB3	50.000	34.885	0.000
Bottom	0.0025	0.0117	COMB3	50.000	-17.443	25.010

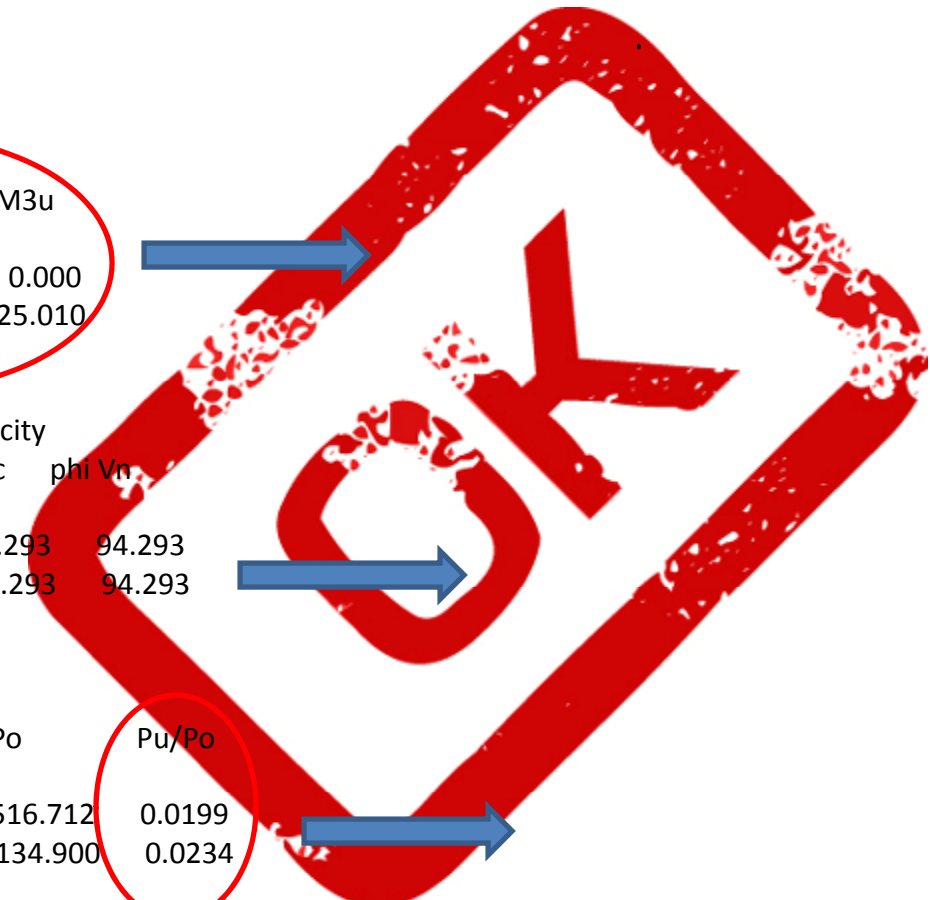
Shear Design Data

Station Location	Rebar cm ² /m	Shear Combo	Pu	Mu	Capacity Vu	Capacity phi Vc	Capacity phi Vn
Top Leg 1	5.000	COMB3	49.973	-0.021	5.000	49.293	94.293
Bot Leg 1	5.000	COMB3	49.973	24.989	5.000	49.293	94.293

Boundary Element Check Data

Station Location	B-Zone Length	B-Zone Combo	Pu	Mu	Vu	Po	Pu/Po
Top Leg 1	Not Needed	COMB3	49.973	-0.021	5.000	2516.712	0.0199
Bot Leg 1	Not Needed	COMB3	49.973	24.989	5.000	2134.900	0.0234

Earthquake Load *



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General

Flexural Check Data

Station	D/C	Flexural	Pu	M2u	M3u
Location	Ratio	Combo			
Top	0.8589	COMB3	50.000	34.885	0.000
Bottom	0.0447	COMB3	50.000	-17.443	25.010

Shear Design Data

Station	Rebar	Shear	Capacity	Capacity			
Location	cm^2/m	Combo	Pu	Mu	Vu	phi Vc	phi Vn
Top Leg 1	5.000	COMB3	49.973	-0.021	5.000	49.293	94.293
Bot Leg 1	5.000	COMB3	49.973	24.989	5.000	49.293	94.293

Boundary Element Check Data

Station	B-Zone	B-Zone	Pu	Mu	Vu	Po	Pu/Po
Location	Length	Combo					
Top Leg 1	Not Needed	COMB3	49.973	-0.021	5.000	2389.339	0.0209
Bot Leg 1	Not Needed	COMB3	49.973	24.989	5.000	2389.339	0.0209



Earthquake Load

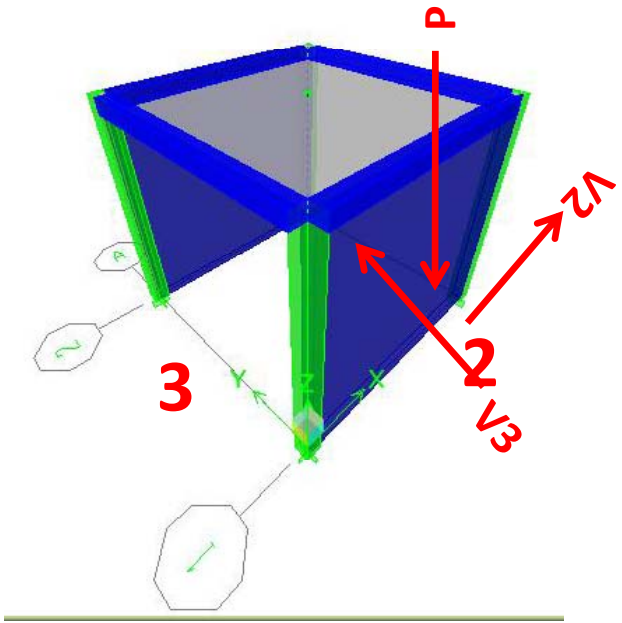


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لطفاً؛ سؤال بفرمایید

۱- کنترل تغییر مکان

۲- کاستن از اندازه تیر و ستون ها

۳- سازه ای که دارای مهار بندی جانبی است. $K=1$ آنگاه (KL/r) تبدیل به رابطه ساده (l/r) خواهد شد.

۱- باید تعداد دیوار های برشی طوری باشد که در هر طبقه رابطه زیر برقرار باشد:

$$\bar{V}_{ul} < 2 \sum V_{cr} \rightarrow \frac{V_{ul}}{2} < \sum V_{cr}$$

$\bar{V}_{ul} = 0.75\bar{V}_u$ → برشی است که در هر طبقه به دیوار برشی می رسد و فرض می کنیم که ۷۵ درصد برش طبقه به دیوار برشی برسد.

$V_{cr} = 0.53\sqrt{f'_c}bd$ → مقاومت برشی از نوع تیری است که توسط دیوار برشی تحمل می شود

۲- سختی دیوار برشی در هر طبقه باید بیش از شش برابر سختی ستونهای آن باشد تا بتوان آن طبقه را مهار شده فرض نمود

$$\sum K_{\text{wall}} > 6 \sum K_{\text{column}}$$

$$K_w = \frac{3EI}{\beta H^3} \quad I = \frac{tl^3}{12}$$

L طول دیوار برشی

H ارتفاع دیوار برشی

t ضخامت دیوار برشی

$$\beta = 1 + 0.75 \left(\frac{L}{H} \right)^2$$

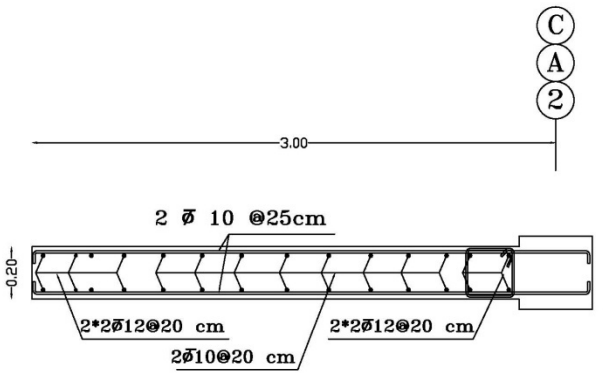
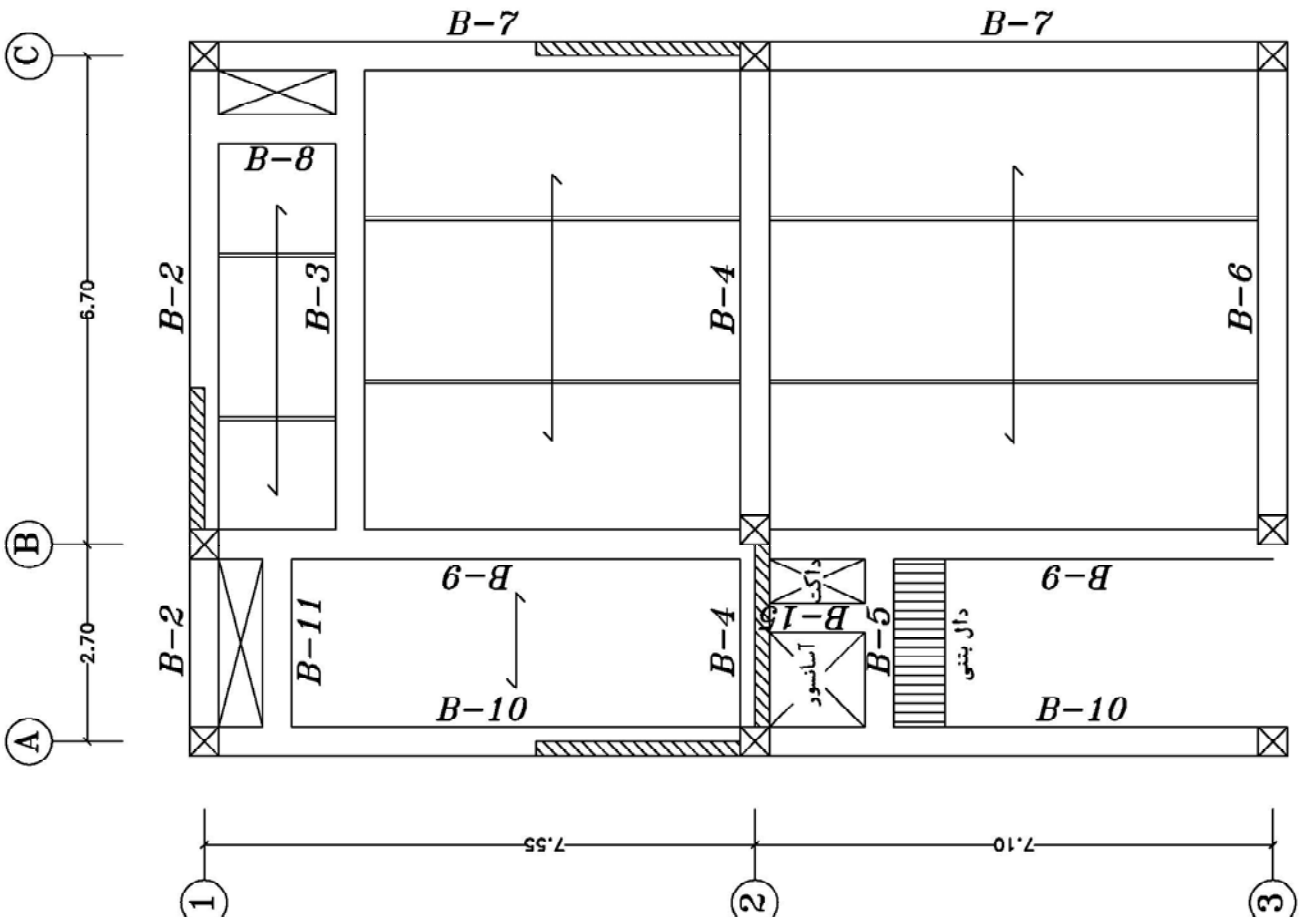
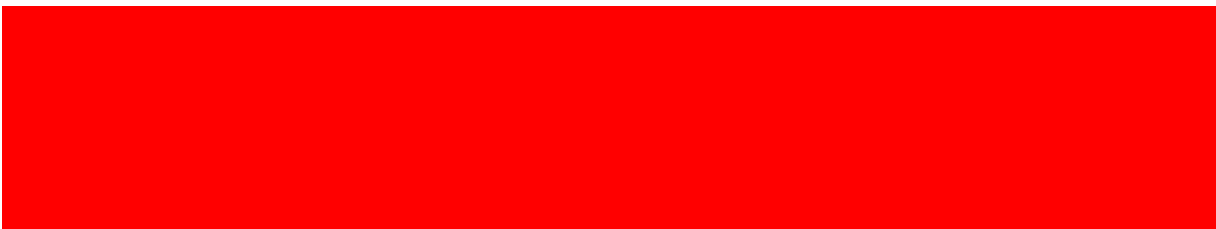
۳- طبق آیین نامه ۲۸۰۰ هریک از سیستمهای قاب و دیوار باید به گونه ای باشد که قاب ۲۵ درصد نیروی زلزله را تحمل نماید. در غیر این صورت نمی توان از ضریب رفتار سیستم دو گانه استفاده نمود

۴- اگر ابعاد و تعداد دیوار های برشی مناسب باشد. ابعاد المان مرزی در طراحی دیوارهای برشی از ابعاد ستون ها بیشتر نخواهد شد.

۵- حتما نیروی بالا رانش یا Up lift پای دیوار کنترل شود.

۶- حداقل ضخامت دیوار برشی ۱۵ سانتی متر در نظر گرفته شود.

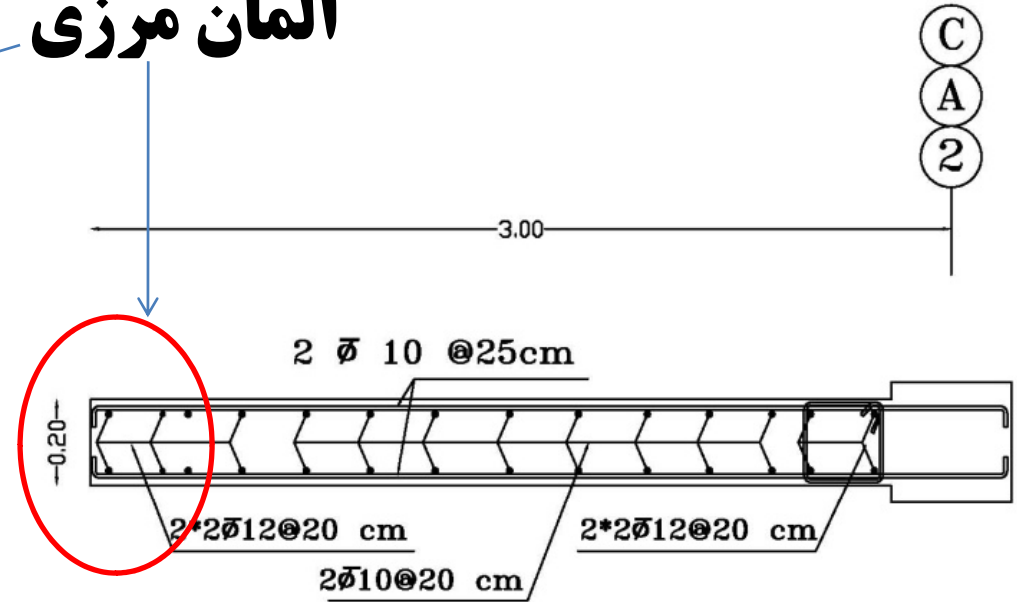
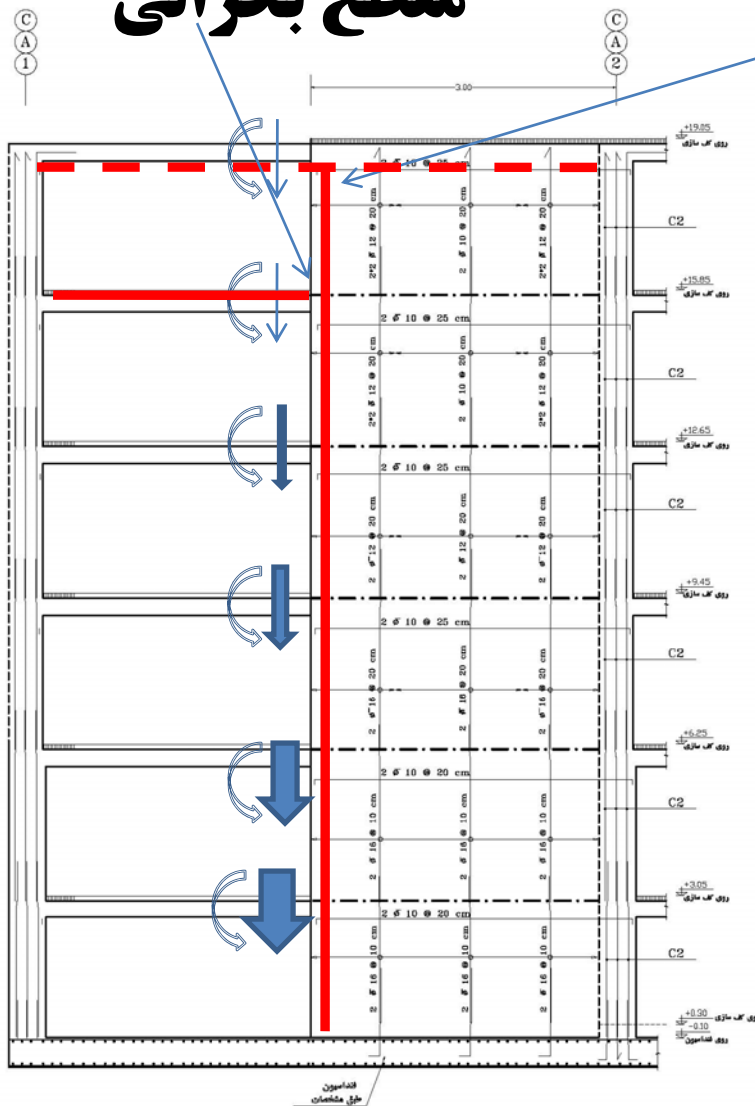
لطفاً؛ سؤال بفرمایید



C
A
2

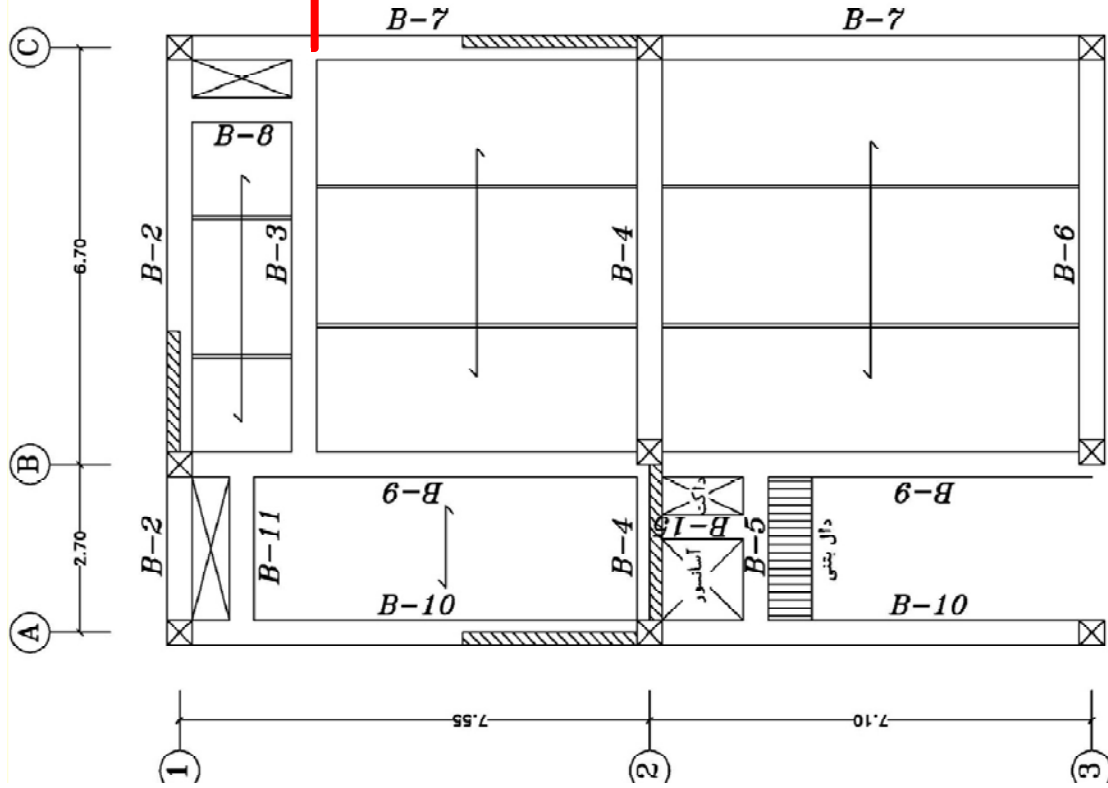
مقطع بحرانی

المان مرزی

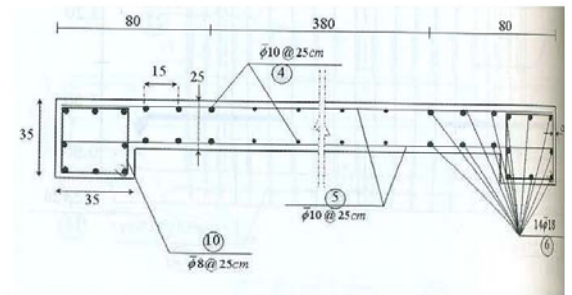
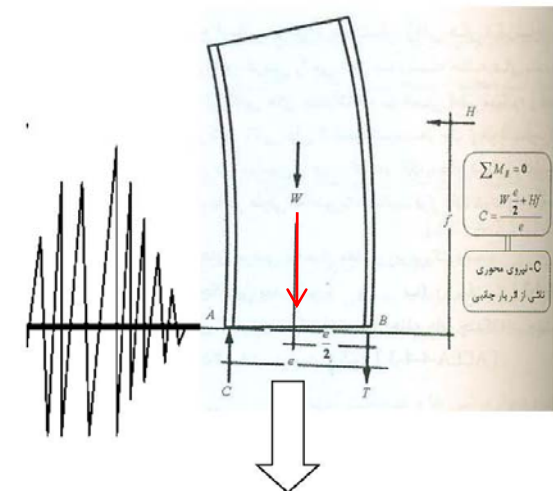
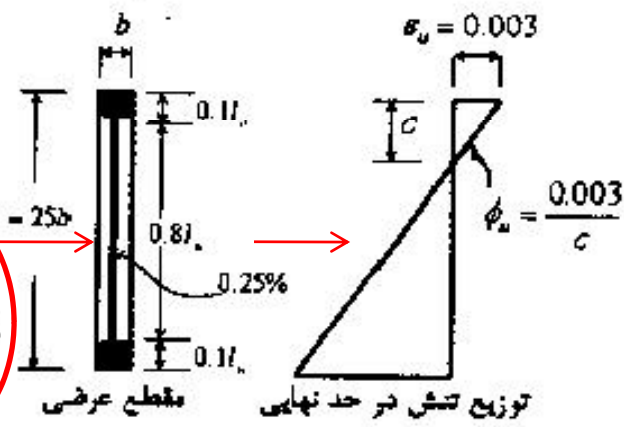
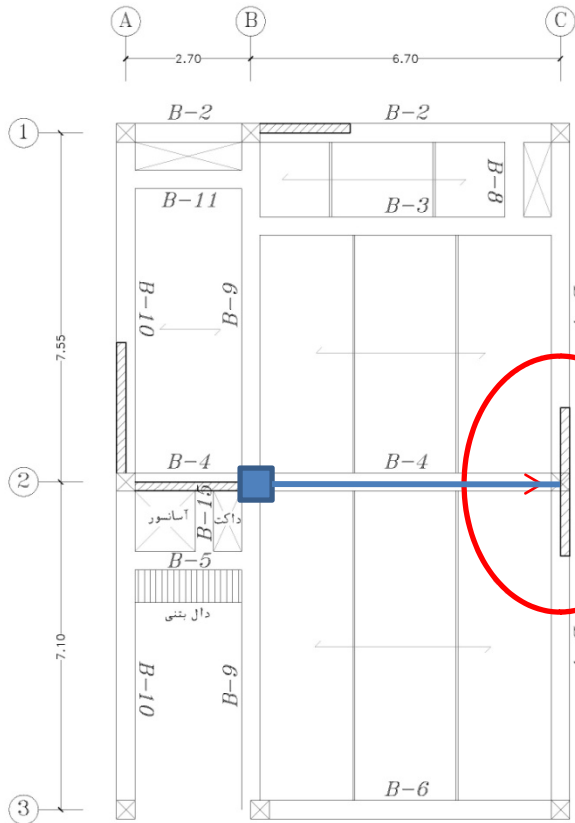


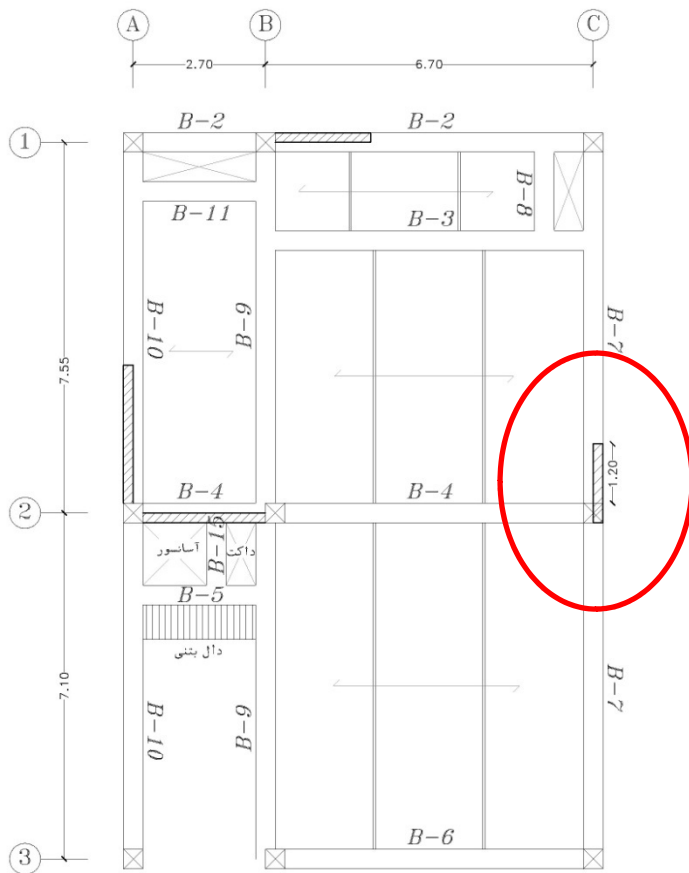
صرف نظر از نوع دیوار برشی نیاز به معرفی ستون می باشد.

اگر طول تیر کم باشد، برش کنترل کننده است.



در عملکرد خمشی دیوار برشی اخلال ایجاد می کند.

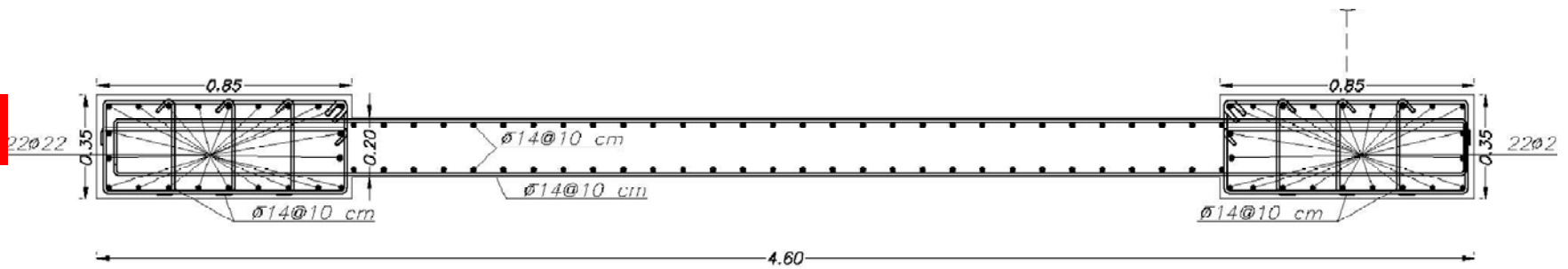
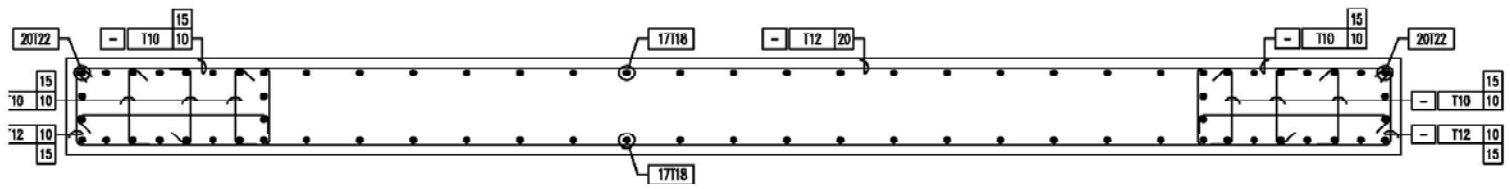
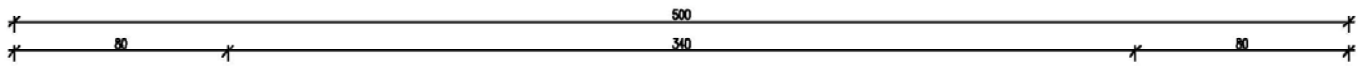
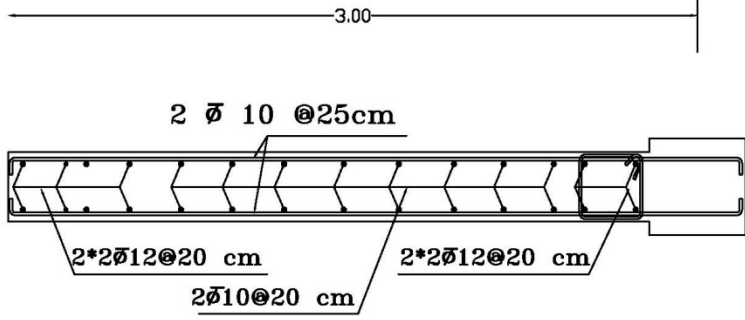




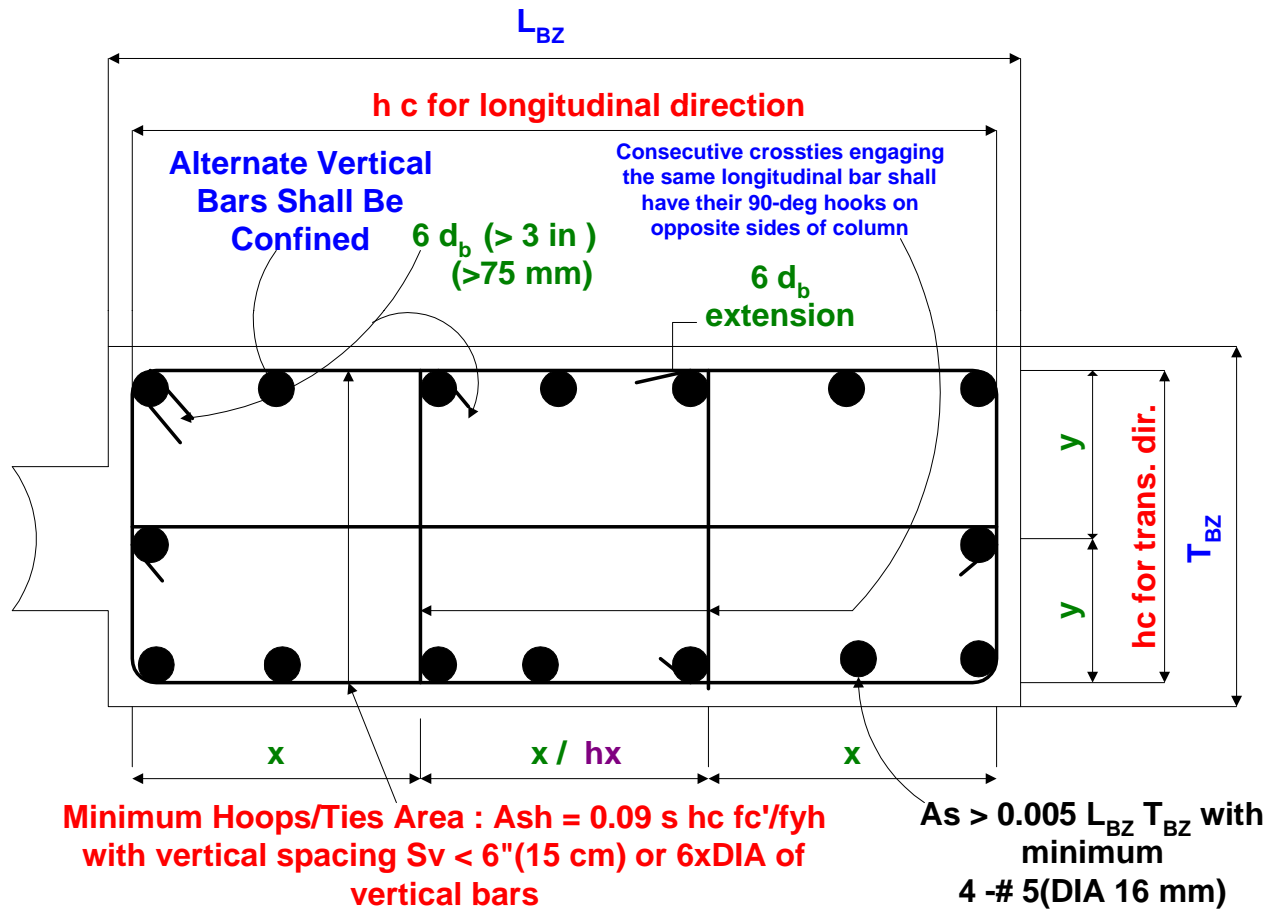
به علت اینکه طول مورد نیاز برای برش
 تامین نمی شود.
 این مقطع مشابه ستون عمل می کند.
 (بند او ۲)



C
A
2



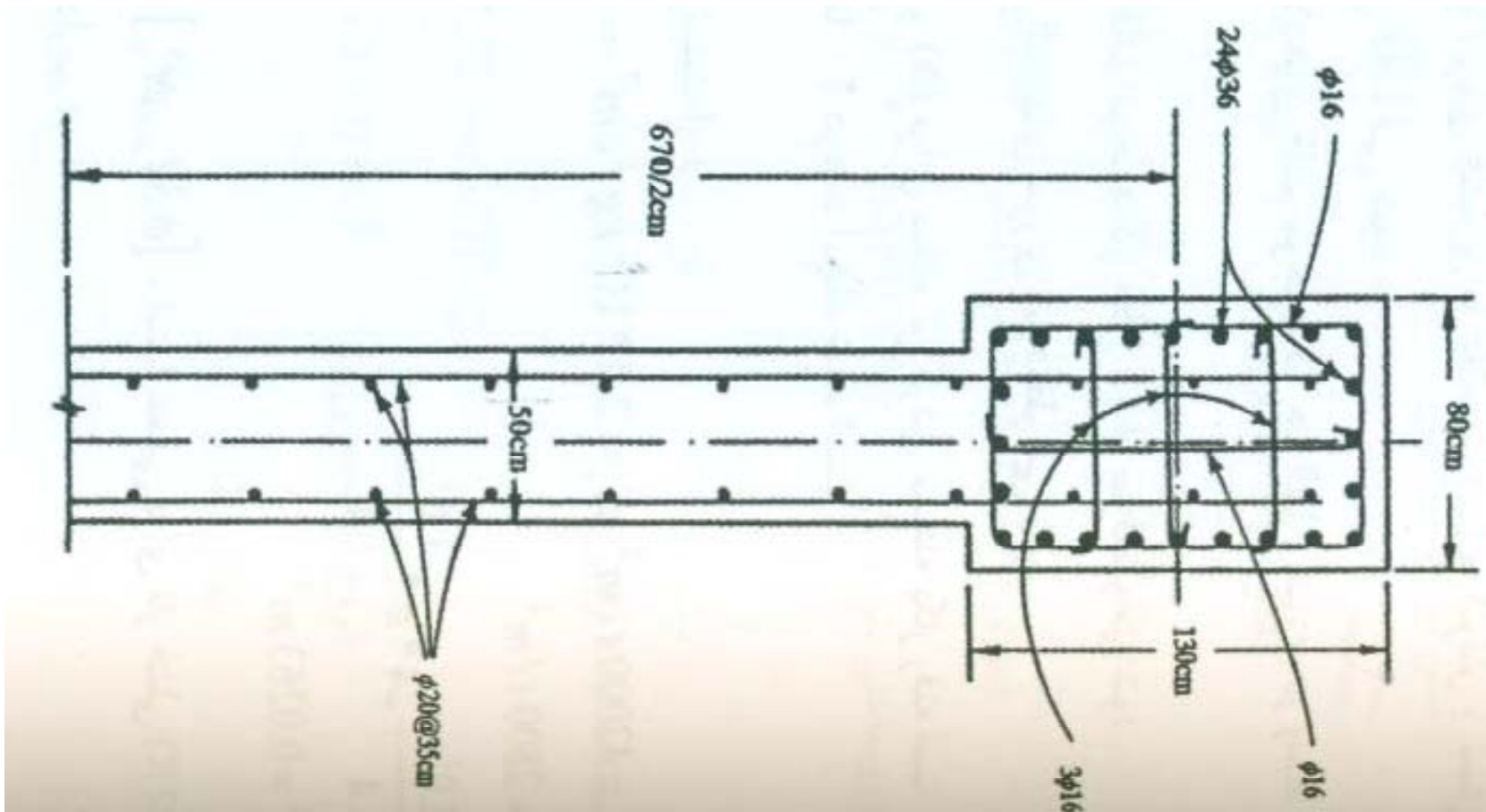
ACI

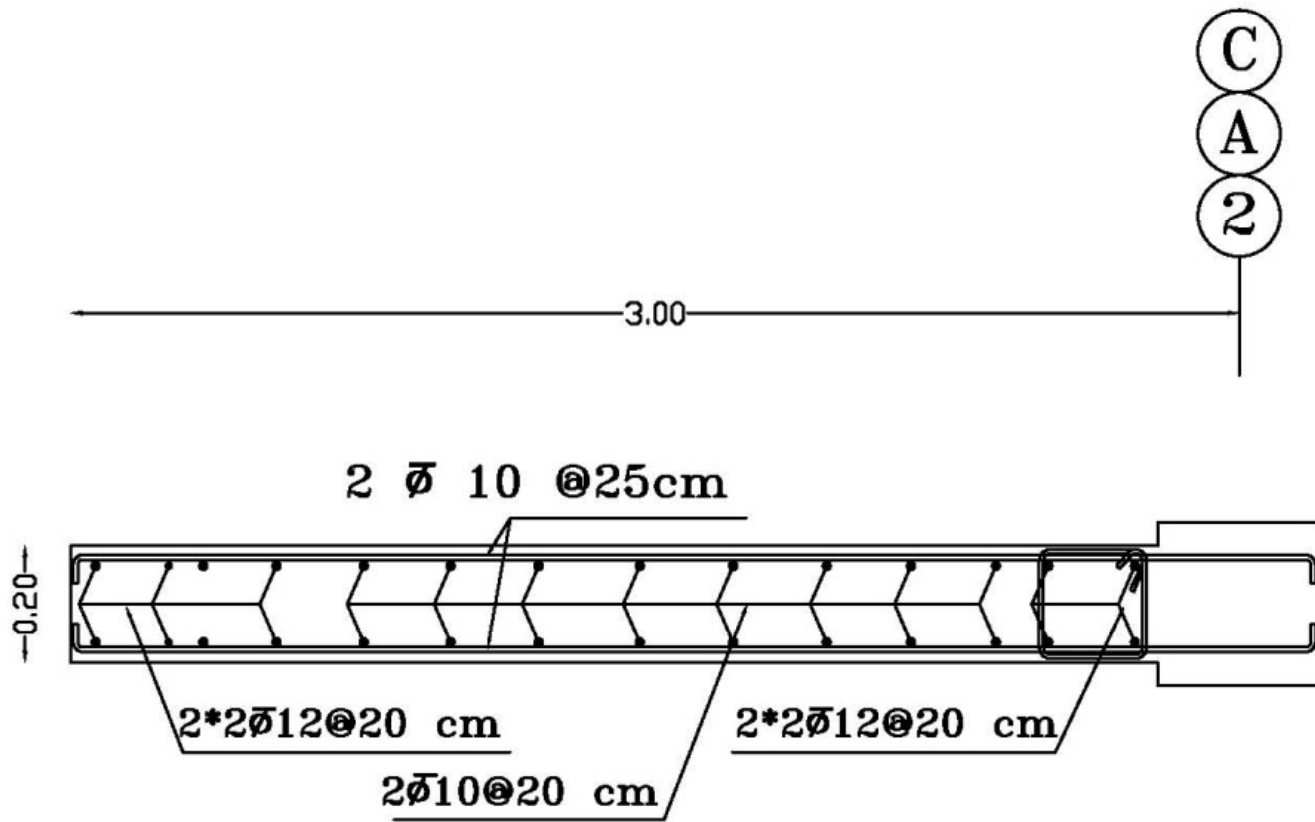
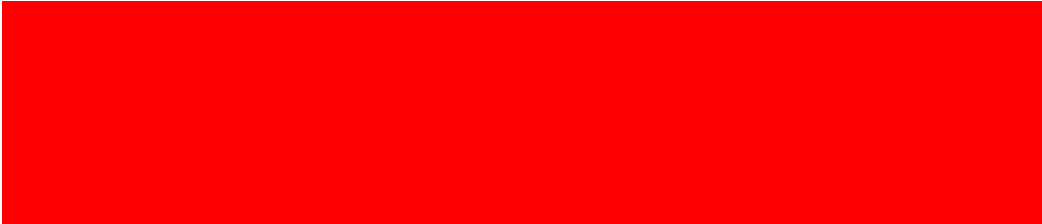


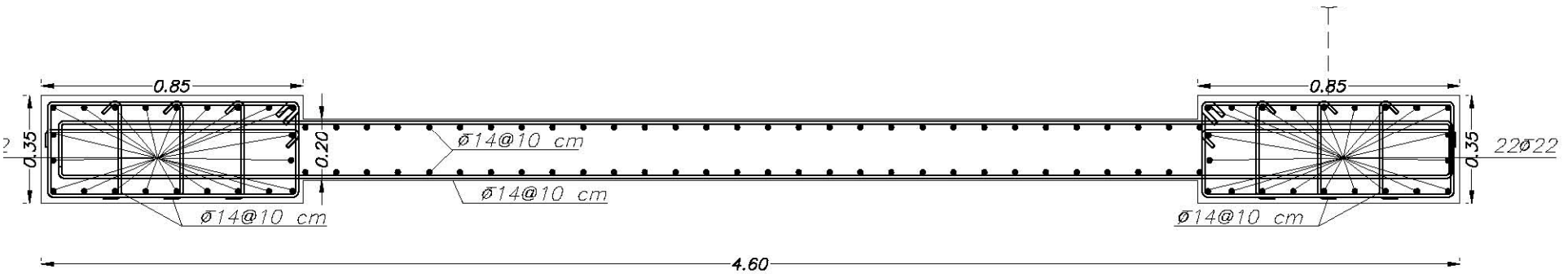
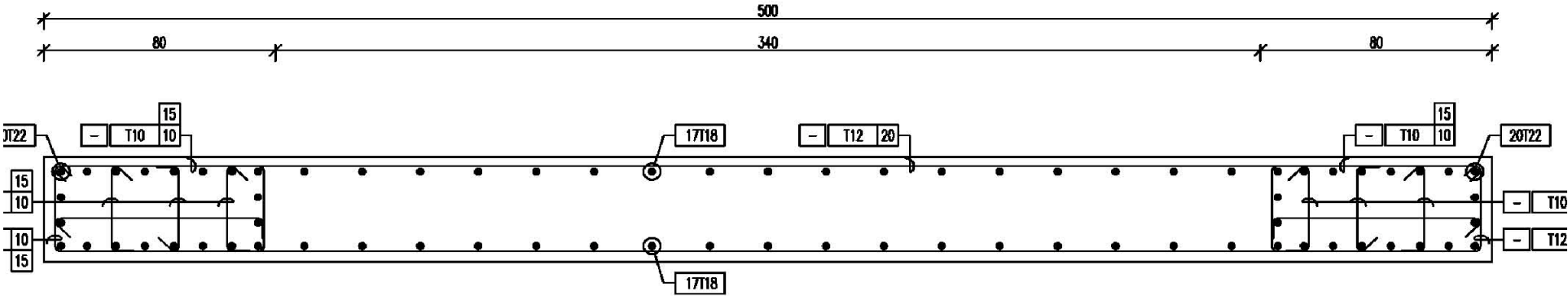
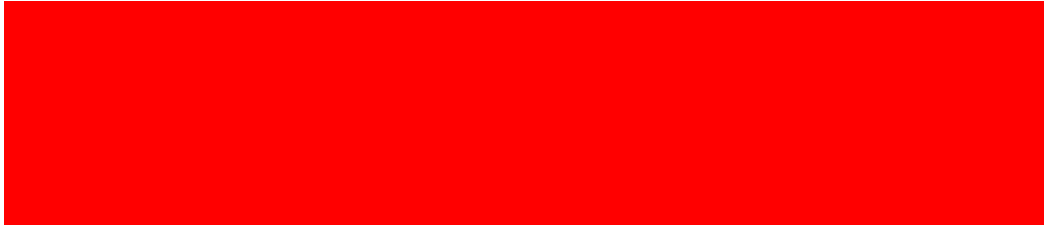
Notes:

- Per UBC:
'x' or 'y' < 12 inches (30 cm)
Per - ACI
'hx' < 14 inches (35 cm)
- Hoop dimensional ratio
($3x/2y$) or ($2y/3x$) < 3
- Adjacent hoops shall be overlapping
- Per ACI:
 $S_v < T_{bz} / 4$
 $S_v < 4 + [(14-hx)/3]$

ACI







باشکر
خیاط زاده

